

THE
AMERICAN JOURNAL
OF THE MEDICAL SCIENCES.

SEPTEMBER, 1892.

SEASONAL RELATIONS OF CHOREA AND RHEUMATISM FOR
A PERIOD OF FIFTEEN YEARS—1876 TO 1890 INCLUSIVE.¹

By MORRIS J. LEWIS, M.D.,

PHYSICIAN TO THE ORTHOPÆDIC HOSPITAL AND INFIRMARY FOR NERVOUS DISEASES, TO THE
CHILDREN'S HOSPITAL, AND THE PENNSYLVANIA HOSPITAL.

THE present study is a continuation of a former paper upon the same subject read before the Philadelphia Neurological Society, October 25, 1886, published in the *Philadelphia Medical News* of November 13, 1886, and includes the *months of onset* of 1383 separate attacks of chorea, and 673 separate attacks of acute inflammatory rheumatism.

Of the former, 717 are from the note-books of the *Philadelphia Orthopædic Hospital and Infirmary for Nervous Diseases*, and include the 436 attacks reported in the paper alluded to; the 281 new attacks having been carefully extracted from the records for the years 1886-90 by my friend Dr. Charles W. Burr, to whom I am indebted for much assistance in the preparation of this paper.

The remaining 666 cases occurred in Boston, Mass., and have been collected for me through the kindness of Dr. James J. Putnam and Dr. Philip Coombs Knapp, of that city, from the records of the City Hospital, and the Massachusetts General Hospital, respectively.

The 673 separate attacks of acute inflammatory rheumatism have been collected from the records of the Pennsylvania Hospital; for the years 1876-90.

My intention was to collect statistics of these two diseases from several cities widely separated geographically, but I found that these records could not be obtained.

¹ Read before the Association of American Physicians, at Washington, May, 1892.

The weather records were extracted from the monthly reports of the Signal Service Bureau, and furnished through the kindness of the Washington and Philadelphia offices.

Sufficient of interest has been found to warrant this extended study, which was not undertaken to substantiate any particular theory, but to prove or disprove the results obtained in my former paper, where it was considered that a close relationship existed between the number of attacks of these two diseases and the number of storm centres passing within 400 miles of Philadelphia per month.

In the present study, as in the former, the "storm tracings" were obtained by taking the number of tracks of centres of low barometer passing within 400 miles of the localities studied, the 400-mile radius having been previously found to furnish the tracing most closely resembling that of chorea. The tables are so arranged that by the repetition of the first half of the year, any portion of any one tracing may be studied in unbroken sequence.

Certain sources of error must be alluded to, and although at present it is impossible to entirely eliminate them, it is not considered that the final result is thereby vitiated.

1st. The attacks recorded are but a portion of those occurring in the localities studied, while the meteorological data are complete as far as they go.

2d. The division of the year into months of unequal length is unfortunate but unavoidable, and all the numerical tracings, therefore, show a tendency to conform to this monthly irregularity; but even this does not vitiate their accuracy, as a reduction of the figures to a supposititious monthly length of thirty days does not materially alter their peculiarities.

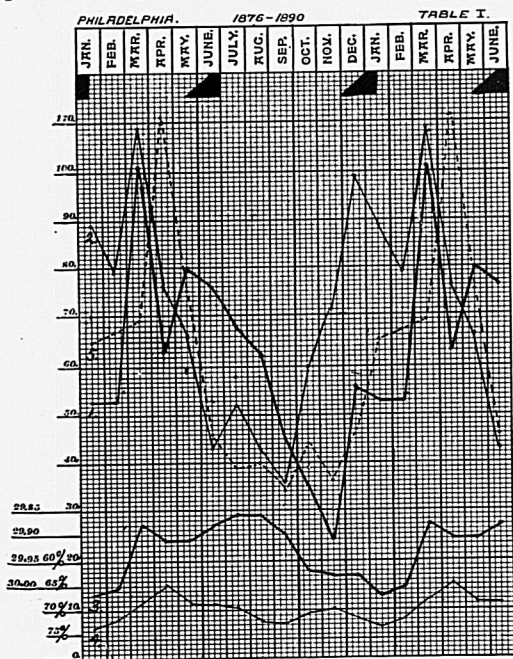
3d. Monthly *averages* tend to obliterate daily peculiarities and variations, for by taking the monthly mean of any element the very effect we wish to study may be smoothed out. This is further accentuated when monthly means for many years are taken.

4th. The methods of recording the tracks of centres of low barometer (storm centres) are, in the language of the weather reports, "approximately correct" only.

5th. Much difficulty has been encountered in obtaining definite answers as to the exact time of onset of the attacks. A large number of cases have, therefore, been discarded on this account, and only those retained for study that were apparently beyond doubt.

This objection probably pertains less to the records of the Orthopædic Hospital and Infirmary for Nervous Diseases than to hospitals in general, owing to the unusually accurate method of taking histories on blanks printed especially to investigate the various nervous diseases—the exact date of onset of chorea, for instance, being one of the points

particularly investigated. A failure to note this point correctly would naturally have a tendency to cause the case to be recorded as originating later on in the year than was actually the case.

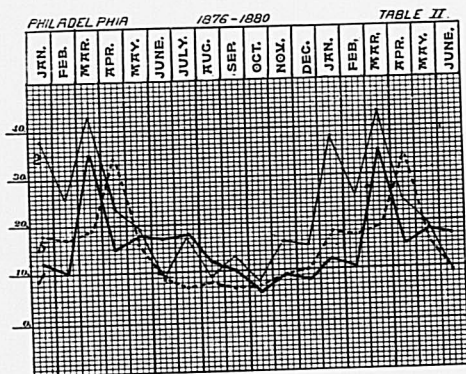


1. 717 separate attacks of chorea.
2. Storm centres passing within 400 miles of Philadelphia.
3. Mean barometer.
4. Mean relative humidity.
5. 673 separate attacks of acute inflammatory rheumatism.

6th. "Habit. chorea," as far as the Philadelphia statistics are concerned, has been excluded from the list, but the cases due to *fright* have been unfortunately included with those due to other causes.

Table I. represents the data for Philadelphia for the fifteen years investigated, viz., 1876-90 inclusive.

Tracing 1, of this table, represents the months of onset of 717 separate attacks of chorea. It will be seen that November shows the fewest attacks, viz., 24, or 3.3 per cent.; a rapid rise occurs in December to 56, or 7.8 per cent. The tracing remains almost stationary during January and February, and then suddenly reaches its highest point in March, viz., 101, or 14 per cent. A fall occurs in April to 63, or 8.7 per cent.; a rise in May to 80, or 11.1 per cent., and then the tracing falls almost steadily to its lowest point in November.



1. 170 separate attacks of chorea
2. Storm centres.
5. 161 separate attacks of rheumatism.

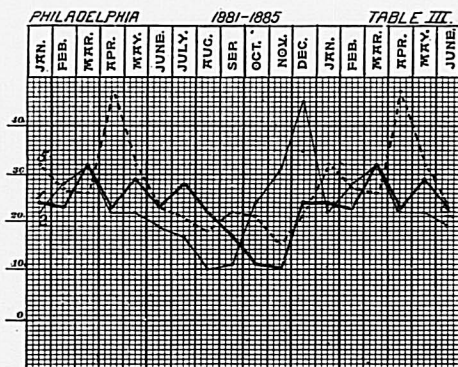
When this period of fifteen years is divided into three periods of five years and separately studied, the same character of tracing is still observed in each. See Tables II., III. and IV. The latter table is the most irregular, although still possessing many of the same features shown in II. and III.

Turning to the records obtained in Boston for the same period of fifteen years (Table V.), it will be found that of the 666 attacks there depicted (Tracing 1), the fewest also occur in November, viz., 30, or 4.5 per cent., although September, with 31 attacks, or 4.7 per cent., is practically the same. The line then rises, with a slight break in February, to its highest point in April, viz., 96, or 14.4 per cent., and then falls regularly and steadily to its lowest point in September and November.

The chorea record for Boston for the five years ending 1890 shows a somewhat different character of tracing (Table VI., Tracing 1, repre-

senting 357 cases). The months of March, April, May, and June are all practically alike—varying from 43 to 45 cases, 12 per cent. to 12.6 per cent. A fall then occurs, as before, to the lowest point in November, viz., 11 cases, or 3.1 per cent. This table includes 125 cases from the records of the Massachusetts General Hospital, the remainder being from the City Hospital records.

The irregularity of the tracing is due to the cases from the latter hospital, as those from the Massachusetts General, when taken alone, give



1. 266 separate attacks of chorea.
2. Storm centres.
5. 306 separate attacks of rheumatism.

a record very similar to the general tracing which pertains to Philadelphia, the high period being in March, 20 cases, or 8.8 per cent.

The cases from the City Hospital show the greatest number in April.

In regard to these cases Dr. Putnam writes me as follows:

"I had not this particular investigation in view when the record of these cases was made, so there may be some errors. The time of onset was sometimes given as 'two months ago,' that is, two months before the time I saw the patient. In all probability the mothers of the children would more likely have understated than overstated the duration of the disease."

An error in this direction, as previously stated, would naturally place the dates of onset of the attacks later on in the year than they should be.

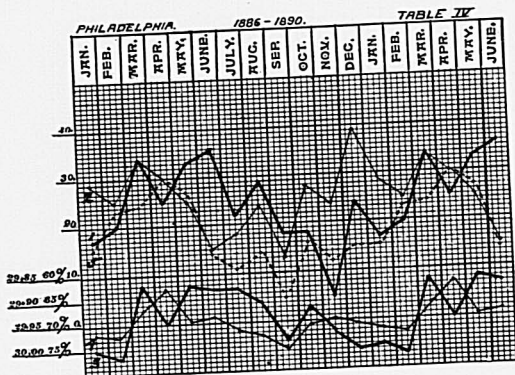
Adding all the cases together, month by month, gives the following result: January, 106; February, 101; March, 172; April, 159; May,

160; June, 150; July, 126; August, 106; September, 76; October, 74; November, 54; December, 99. Total, 1383.

This study of the largest number of attacks of chorea that, as far as I am aware, has been collected together, should prove the fact already noticed, by several observers, that chorea in the United States is essentially a disease of the spring, and that the fewest attacks occur in the autumn. So far, the *seasonal* relation is proven.

In order to see whether this spring augmentation was noticeable in the prevalence of disease in general, I have investigated the time of year when the greatest amount of sickness occurs in Philadelphia.

In my own practice, which is a general one, I find that the most visits are paid in March, viz., 15.3 per cent., and that from that point the per-



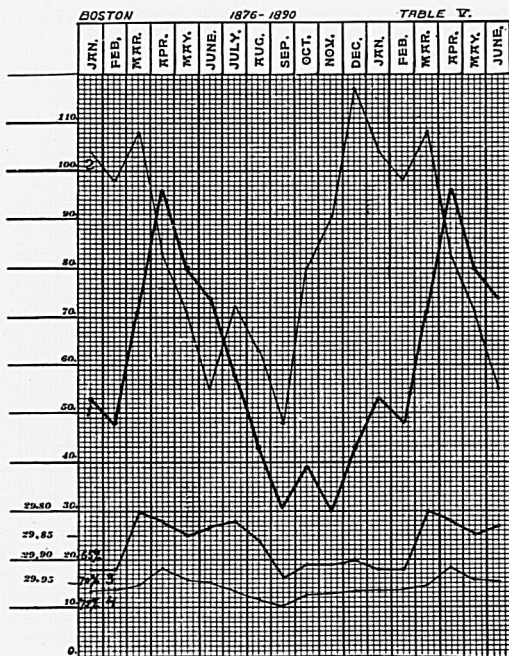
1. 281 separate attacks of chorea.
2. Storm centres.
3. Mean barometer.
4. Mean relative humidity.
5. 206 separate attacks of rheumatism.

centage of visits falls to midsummer (absence of patients from city largely influences this fall); then gradually rises to January to 13.3 per cent.; falls in February to 10.5 per cent., and rises to its highest point in March.

This varying percentage I find is about the same as regards the practice of other physicians whom I have interrogated concerning this point, and might be considered by some as a sufficient cause to explain the March rise in the Philadelphia chorea tracings, upon the theory that March is the month when most disease occurs; but might I not perti-

nently ask the question, What causes this March rise in the amount of disease?

Over-study has been considered by many to be one of the most potent causes of chorea. Sachs states (Keating's *Encyclopædia of Diseases of*



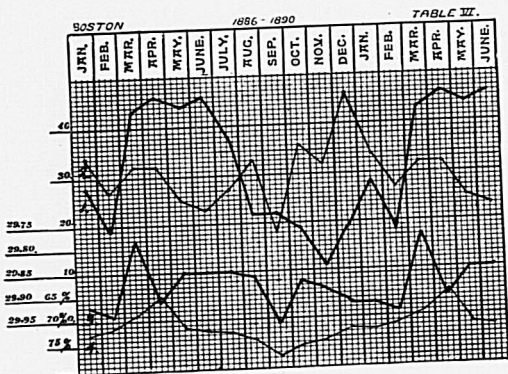
1. 666 separate attacks of chorea.
2. Storm centres.
3. Mean barometer.
4. Mean relative humidity.

Children, vol. iv.) that "many of the attacks occurring in early autumn follow upon the opening of school, and that in March the strain of winter duties is greatest;" and Sinkler (*Pepper's System of Medicine*, vol. v.)

states that "the annual examinations in our schools give a number of cases of chorea."

Upon inquiry I find that examinations in the Philadelphia public schools take place in the early part of January and in the latter half of June, and that preparatory reviews begin six weeks previously; that in February and March, the earlier months of the term, the pressure of study is very light; May being the hard month on account of the preparations for the final examinations in June.

In the normal schools, where the average age of the children is over fourteen years, the pressure of study in April and May is said to be



1. 357 separate attacks of chorea.
2. Storm centres.
3. Mean barometer.
4. Mean relative humidity.

severe, but it is not probable that any considerable number of these children are included in this study, as the public schools certainly furnish the vast majority.

I have endeavored to express graphically, by the wedge-shaped figures on the top of Table I, the time of the semi-annual examinations—the increasing width of the figure representing the increasing pressure of study during the reviews until the examination period is reached.

If over-study is the main exciting cause of chorea, why does the tracing reach its highest point in March, midway between the examinations, when no reviews are taking place and the study is light? Or, if this March rise is the after-effect of the hard work during the midwinter

examination, why does the tracing fall from its moderately high point in May as the final, and hardest, examinations of the year are approached? It is true that as the December reviews and the January examinations draw near there is a rapid rise in the number of attacks; but here again a slight fall in the tracing is seen *during the examination period*, when the worry might be supposed to be at its height.

The children with chorea applying at the Infirmary belong to an unusually intelligent class of society, and are themselves intelligent; as a rule, they are quite anæmic, and it is undoubtedly difficult to determine how much over-study has contributed to bring about this result and the exaggerated nervous susceptibility accompanying it.

The next etiological factor to be studied is the weather.

The "weather," using the word in its broadest sense to express the varying atmospheric and electrical phenomena which we call weather, is a strangely complex whole, which is exceedingly difficult to reduce to lines and figures.

It was thought that the record of "centres of low barometer," or "storms," as they occurred month by month, would, on account of the fact that a "storm" of necessity includes many meteorological factors, more fitly than any other series of figures represent the deleterious elements of "weather," but the present study does not entirely uphold the conclusions previously drawn in regard to this point.

In Table I. the storm line (Tracing No. 2) is singularly like that of chorea (Tracing No. 1) for the same period, in its general configuration, but there is a considerable lack of correspondence between them in summer and autumn; in the former the chorea line rises much higher, and in the latter falls much lower, than would be expected did the storm tracing express the true etiological factors of this affection.

Were the thunder-storms, which nearly all occur in summer, included in the storm tracing, the latter would be considerably augmented at the point where, upon this theory, there is the unexplained rise in the chorea tracing.

The Tables II., III., and IV., all show this same overlapping of these tracings in summer and winter.

In my former paper I made use of the following expression:

"Anyone looking at these two tracings, as shown in the chart, will have to acknowledge that the marked resemblance which exists is more than accidental, but to decide which factor in this complex disturbance, which we call a storm, is the baneful one, or in what manner it acts, is difficult."

This conclusion was reached after studying the tracings for the years 1876-85 inclusive (which may be reproduced by adding together Tables II. and III.).

In the present study the addition of 281 more cases for the five years 1886-90 inclusive, does not, as we have seen, materially alter

the general configuration of the tracings; but upon dividing the whole number of attacks into periods of five years each, and studying them separately, it will be found that the last series (Table IV.) shows but a partial resemblance between the chorea and storm tracings. For instance, June shows the highest point reached by the chorea line, viz., 36 attacks, or 12.6 per cent., while the storm curve is almost at its lowest point, so that an element of doubt necessarily arises as to whether the principal exciting cause has been determined.

At this point of the study the thought arose that if the chorea and weather statistics for the same period of time, of several localities far apart, could be studied and compared, something of interest might be forthcoming, and the proper etiological value of weather influence determined. The only statistics that could be obtained, after considerable effort, were those of Boston, kindly furnished me by Drs. Knapp and Putnam.

Table V., Tracing No. 1, shows the tracing obtained from the study of these 666 cases of chorea occurring in Boston during the fifteen years 1876-90 inclusive; this tracing has been previously described. The storm tracing of this table (No. 2) resembles in its general aspect the corresponding tracing for Philadelphia (Table I., No. 2), the two maxima and minima coinciding exactly, as would be expected; but on comparing it with its accompanying chorea tracing, the resemblance between them is not as pronounced as is seen in Table I., and there is a greater exaggeration of the winter dissimilarity previously alluded to. When the storm tracing for Boston for the years 1886-90 inclusive (Table VI., No. 2) is compared with its accompanying chorea tracing (No. 1), previously described, for the first time but little resemblance is seen between them.

Unable to find a satisfactory explanation, that will cover all cases, in the storm tracings, I again turned to the records of the mean actual barometer and mean relative humidity.

On this point I previously remarked "that there appears to be an increase in the number of attacks of chorea with a fall of the mean relative humidity and barometer tracings."

To make these tracings more intelligible they have been reversed in the tables, so that any relationship between them and the other tracings may be more readily detected.

Naturally some resemblance might be expected to exist between these tracings and that of the storm centres, as they are component parts of the storm disturbance. The rise and fall of the barometer tracing (No. 3) in the various tables bears a considerable resemblance to that of chorea, and this is particularly noticeable in Tables IV. and VI., where the resemblance of the storm to the chorea tracing is least marked. It must be borne in mind that Tracings 3 and 4 are reversed, a rise in the tracings really expressing a fall, and *vice versa*.

The tracing obtained by recording the number of cloudy or rainy days, and also that by measuring the precipitation in inches of rain and snow, being also component parts of a storm, bear some resemblance to the latter tracing; they are not represented in the tables, as a large number of lines is confusing.

The average monthly temperature steadily rises to its highest point in July from its lowest point in January, and as steadily falls again.

The high spring point of the chorea tracing corresponds with cool weather and a *low* barometer and mean relative humidity tracing, but the rise in the autumn corresponds with cool weather and a comparatively *high* barometer and mean relative humidity, the temperature record, therefore, giving us but little information.

Table I. shows the months of onset of 673 separate attacks of acute inflammatory rheumatism occurring in Philadelphia for the years 1879-90. (Tracing No. 5.)

April has 111 attacks, or 16.5 per cent. A rapid fall occurs until the lowest point in September is reached—34 attacks, or 5.1 per cent.—and from this point the line somewhat irregularly rises until the high point in April is reached. Each of the Tables II., III., and IV. show this same character of the rheumatism tracings and the marked resemblance which they bear to the fluctuations of the storm record, the high point in the latter antedating the month of greatest number of attacks of rheumatism, as if its influence was preparatory, as remarked in my former paper.

Unfortunately, no trustworthy records of this disease could be obtained from other cities to compare with those of Philadelphia.

If it is conceded that the relation is positive, as far as cause and effect are concerned, between storm and neuralgia, why may not the same relationship, although possibly to a different degree, be conceded to exist between the varying meteorological conditions and other nervous diseases, notably chorea, which occur in children who are in an unstable nervous condition, depressed in vitality, and possibly over-worked and over-taught?

The conclusions drawn from this paper are as follows:

- 1st. The seasonal relationship of chorea and rheumatism is proven.
- 2d. There is a marked resemblance in form between the chorea and rheumatism tracings and the tracing representing the total amount of sickness present in the community per month.
- 3d. This monthly variation in amount of sickness is not a cause of the fluctuation in the chorea and rheumatism tracings, but is itself probably due to the same influence.
- 4th. While over-study assuredly plays a most important rôle in predisposing children to chorea, the months of greatest study, and therefore presumably of the greatest depression of bodily vigor, do not coincide

with, or even precede with any regularity, the months of greatest frequency of this disease.

5th. It is more than probable that "weather" is one of the most important predisposing causes of both of the diseases studied in this paper, although precisely which meteorological factor is the baneful one does not clearly appear. No one element of "weather" explains fully the fluctuations of these tracings for chorea, although in the barometer and storm statistics the relationship appears to be closer than to any other etiological factor or factors that have, as yet, been advanced.

It is as if a conclusion was attempted to be drawn from premises, some of which are imperfectly stated or not clearly understood, or possibly even overlooked.

6th. Either this apparently close relationship must be acknowledged to have an important place in the etiology of these diseases, or else the resemblance must be considered to be purely accidental, which seems most unlikely from a study of the tables shown.

More accurate deductions do not appear possible from the data at present at our command.

EXPLANATION OF TABLES.

In all the tables, Tracing No. 1 represents chorea; No. 2, storm centres passing within 400 miles of the locality studied; No. 3, mean actual barometer; No. 4, mean relative humidity; No. 5, acute inflammatory rheumatism.

Tracings Nos. 1, 2, and 5 are interpreted by using the columns of figures commencing at 0 and ascending regularly by increments of 10; Tracing No. 3, by the figures representing barometer readings; and No. 4, by the figures representing percentages. Tracings Nos. 3 and 4 are reversed.

In Table I., Tracing No. 1 represents 717 separate attacks of chorea; in Table II. it represents 170; in Table III., 266; in Table IV., 281; in Table V., 666; and in Table VI., 357.

Tracing 5 represents, in Table I., 673 separate attacks of acute inflammatory rheumatism; in Table II., 161; in Table III., 306; and in Table IV., 206.

COMBINED GYNECOLOGICAL OPERATIONS.

BY GEORGE M. EDEBOHLS, A.M., M.D.,
GYNECOLOGIST TO ST. FRANCIS' HOSPITAL, NEW YORK.

THE fact cannot be gainsaid that the marvellous progress in the diagnosis and treatment of diseases peculiar to women, attained within the past decade, is due almost entirely to surgical as distinguished from purely medical gynecology—which, stated in other words, means that modern gynecology is essentially surgical.